

H. S. John.

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THE FLORA OF THE ELIZABETH ISLANDS, MASSACHUSETTS

JOHN M. FOGG, JR.

(Continued from page 161)

THE ORIGIN OF THE FLORA

Any attempt to unravel the geographic origin of the chief elements comprising the flora of the Elizabeth Islands must not only concern itself with a close scrutiny of the vegetation of the immediately adjacent regions, but must also take into account supplementary evidence from two main sources, namely, the history and nature of the coastal plain and its flora, on the one hand, and the study of the morainal deposits of which most of southeastern Massachusetts is composed, on the other. In fact, so far as concerns the Elizabeth Islands, these two problems are rather inextricably linked and one can scarcely be considered independently of the other.

THE COASTAL PLAIN. Perhaps no geographic province in North America has received greater botanical attention over a long period of time than the Atlantic coastal plain. Occupying a narrow strip east or southeast of the Piedmont Plateau, from which it is more or less sharply marked off by the fall line, the coastal plain has been thought of as extending from the Gulf States and Florida northeastward through the Southern and Middle Atlantic States and reaching its northern limit in northeastern New Jersey, near the Hackensack Marshes, with a representation eastward on Staten Island, Long Island, and the immediate coast district of southeastern Massachusetts.

The surface of the coastal plain presents in general a very gentle slope to the southeast, which, in southern New Jersey for instance,

averages 5 to 6 feet per mile and is seldom over 10 to 15 feet. Eastward, beneath the waters of the Atlantic, the coastal plain continues with the same gentle slope to the 100-fathom mark, where, about 100 miles from shore, it suddenly drops off to abysmal depths. In the southern states the elevated portion of the coastal plain widens to about 150 miles, while the submarine portion dwindles, finally, off the east coast of Florida, to disappear almost entirely. Northward the submerged portion increases in width, reaching 500 miles off the coast of Newfoundland, while the subaerial portion diminishes, becoming a mere fringe of islands and the peninsula of Cape Cod, and finally disappears altogether. Throughout, the soils of the coastal plain are of a recent nature, being largely Tertiary and Quaternary, and it appears likely that the present fall line represents roughly the shore line at the end of Cretaceous time.

The flora of the coastal plain has long been recognized as distinctly southern in character, due partly to the nature of its constituent soils (for the most part, sands, clays, gravels, etc.) which have permitted a northeasterly extension of a Carolinian flora, and partly to its climate, for the temperature is appreciably milder than that of the only slightly more elevated continental mass to the westward.

In the state of New Jersey, three-fifths of which lies inside the coastal plain province, Dr. Witmer Stone recorded in 1910¹ the presence of 479 species of austro-riparian affinities, plants ranging from Florida, Georgia or the Carolinas north to southern New Jersey, some of them reaching Long Island, Massachusetts or, as we now know, even farther northward. The recorded number of such species has been materially increased by recent study.

In 1911 there appeared in RHODORA a very significant paper by Professor Fernald describing a botanical expedition to Newfoundland and southern Labrador.² In part II of this paper, the author discusses the Geographic Origin of the Flora of Newfoundland. Analysis of the constituent floral elements there represented reveals that 274 indigenous plants (35% of the total flora) are southwestern types and that, of these, 60 species (over 7% of the total flora) are Carolinian types, being known from southern New Jersey (or even farther southward), Long Island, southeastern Massachusetts, Nova Scotia and Newfound-

¹ Stone, W. The Plants of Southern New Jersey with Especial Reference to the Flora of the Pine Barrens. Ann. Rept. N. J. Mus. (1910).

² Fernald, M. L. A Botanical Expedition to Newfoundland and Southern Labrador. RHODORA, xiii. 109-162 (1911).

land, but not found inland or in continental eastern Canada. As typical of this Carolinian subclass are cited: *Schizaea pusilla*, *Ammophila breviligulata*, *Carex hormathodes*, *C. silicea*, *Corema Conradii*, *Hudsonia ericoides*, *Myriophyllum tenellum*, *Utricularia geminiscapa* and others.

In an endeavor to account for the presence in Newfoundland of this coastal plain or Carolinian element, Professor Fernald, after considering the part which may have been played by birds, ocean currents, floating ice and logs, and winds, and concluding that they are all inadequate in explaining this distribution, turns to the question of a post-glacial land bridge. Hollick's paper on this subject has already been referred to, and Professor Fernald, quick to see the phytogeographic significance of these conclusions, quotes at length from Hollick's statements and appends corroborative data from other sources.

Evidence derived from a study of the conditions attending the last, or Wisconsin, glaciation indicates that the amount of water then withdrawn from the ocean may have been sufficient, in conjunction with the tendency to uplift already noted, to leave uncovered a considerable portion of the now submerged continental shelf from the South Atlantic states to Nova Scotia and Newfoundland. Of course, as Professor R. A. Daly has recently pointed out, the apparent upward trend of the coastal shelf, resulting in part from the removal of this vast volume of water from the sea, would have been counteracted by the lowering pressure exerted by the tremendous weight of the ice on the continental mass. Nevertheless, it appears that during the Wisconsin advance, and for some time following it, a very considerable portion of the coastal bench must have been above sea level, forming, with the exception of shallow channels such as that draining the Gulf of Maine or Cabot Strait, a nearly continuous platform for the migration of plants, and animals as well, northeastward from the southern states to Nova Scotia and Newfoundland. This strip of silicious soils probably offered a nearly uniform habitat for the advance of species of austro-riparian affinities and their extension northward may even have occurred at a time when the ice had not fully retreated from the mainland of the continent.

Later, with the melting of the glacial ice and the liberation of vast quantities of water to the ocean, and perhaps through the operation of other factors as well, this continental shelf underwent a period of submergence which resulted in the drowning of this coastal plain flora except in those areas, higher than the rest and often widely separated,

which suffered no such submergence. Hence we have today in the Pine Barrens of New Jersey, on Cape Cod and the adjacent islands, in southwestern Nova Scotia and in certain parts of Newfoundland the relics of this formerly continuous flora. That these plants are nearly all species of sterile or silicious soils indicates that they were admirably adapted for migration northeastward along this post-glacial land bridge and probably explains why they have never subsequently extended their ranges to the better, richer soils immediately inland but continue to exhibit the disrupted distribution so well typified by *Schizaea pusilla* and *Corema Conradii*.¹

In treating this subject elsewhere, Professor Fernald says, "Of greater interest are the coastal plain species, because they represent in New England, eastern Canada and Newfoundland a relic of the extensive flora which during the late Tertiary migrated northward along the then highly elevated continental shelf and at the drowning of the shelf were left as relics at isolated points. This isolated remnant of the flora derived from the southern coastal plain is represented by about 200 species north of New Jersey, and nearly every excursion to southwestern Rhode Island, Cape Cod, Plymouth County (Massachusetts), Nantucket, southern Nova Scotia, Cape Breton, eastern New Brunswick, Prince Edward Island, the Magdalen Islands or southeastern Newfoundland, adds to the number of thus isolated species known to us or extends our knowledge of those already recognized."²

And in 1921, in discussing the results of botanical exploration in Nova Scotia, the same author states that "if there were need of further evidence that, since the Pleistocene glaciation the continental shelf of eastern North America has been high in the air, affording an essentially continuous line of migration across the mouth of the Gulf of Maine to Nova Scotia, thence to Newfoundland, that evidence is now abundantly at hand. A striking feature of this migration northward of the southern coastal plain flora is the fact that several distinctive species or genera, *Schizaea pusilla*, *Lophiola*, *Habenaria flava*, and perhaps *Ceratiola*, reached Nova Scotia without establishing colonies on Long Island, Cape Cod or Nantucket. This would seem to indicate that the uplifted shelf was a region of some complexity or else some subtle qualities in the habitats of these plants."³

¹ See Fernald. l. c. Plate 90, opp. p. 140.

² Fernald, M. L. The Geographic Affinities of the Vascular Floras of New England, the Maritime Provinces and Newfoundland. Amer. Jour. Bot., v. 224 (1918).

³ Fernald, M. L. The Gray Herbarium Expedition to Nova Scotia. 1920. RHODORA, xxiii. 168 (1921).

Enough has probably been said to indicate the overwhelming amount of botanical evidence in favor of a post-Pleistocene land connection permitting the northeastward extension of a southern coastal plain flora. It now becomes imperative to inquire what part this connection played in the migration of plants to the area under immediate consideration. However, before discussing the direct bearing of these findings upon the problem as presented by the Elizabeth Islands, it will be found helpful to consider what has already been learned concerning the adjacent areas, especially Nantucket, Martha's Vineyard and Cape Cod.

NANTUCKET. Nantucket, from its isolated position to the southeast, might be expected to have caught more of these coastal migrants than the areas to the west and northwest and is therefore considered first. For our modern knowledge of the flora of this island we are indebted to the discerning and painstaking researches of the late Eugene P. Bicknell, whose account of "The Ferns and Flowering Plants of Nantucket" appeared in the Bulletin of the Torrey Botanical Club from 1908 to 1919. The final section of this paper is devoted to a consideration of the origin of Nantucket's flora.¹ Omitting the hybrids, Bicknell finds upon the island 1103 [1108] species of plants of which 362 [31%] are listed as introduced and 746 as native. Of the 746 indigenous species, "over one-half [373 +] . . . may fairly be accounted as prevailingly more southern in their general distribution," while "something over 150 species . . . are at least prevailingly more northern in their general distribution."

Turning first to the plants of southern affinities, we find that over a hundred of them reach their northeastern limit of range in southeastern Massachusetts, others reach Vermont, New Hampshire or Maine, others occur in the Maritime Provinces, while a small group is found in Newfoundland. The author then gives a list of 38 plants which appear not to have been found at any more northern or eastern point than Nantucket. It is of interest to note, in passing, that only 8 of these are known from the Elizabeth Islands. More than 190 of the prevailingly southern plants occur in the Pine Barrens of New Jersey, over 300 are plants of the coastal plain elsewhere in that state, while all of Nantucket's southern-ranging maritime plants, about 40 species, also occur in New Jersey. Thus we have over 530 species [considerably more than 50%] in the Nantucket flora which display this south-

¹ Bicknell, E. P. Bull. Torrey Club, xlv. 423 (1919.).

ern relationship. To account for this large percentage of austral forms Bicknell resorts to Fernald's views on the submerged coastal shelf and sees isolated on Nantucket the remnants of an extensive flora of southern derivation belonging to the New England seaboard of Tertiary time, "a flora lost to our later day with these broad coastal tracts which now lie beneath the sea. Yet not wholly lost. We find it still, much of it, we may believe, in the less disturbed flora of our more southern coastal plain, and we find its remnants persisting as the merest fringe along the withdrawn more northern coast-lines of the present day. And isolated on Nantucket it has been preserved to us in that assemblage of southward ranging plants, now a primary element in the general composition of the flora."¹

Turning now to the more northern element in the Nantucket flora we find a group of over 150 species of plants. Of this number about 15 are found nowhere at a more southern point, while about 45 are near the southern limit of their coastwise range; others reach south to Long Island and a large number find their southern limit in New Jersey. In this connection it is interesting to note that of the list of 59 species given by Dr. Stone as reaching from the Maritime Provinces south to New Jersey, 18 are unknown from Nantucket. Stone's list, as it appears in his *Flora of Southern New Jersey*,² is here given. It should be observed that the terminology has been revised so as to correspond to that employed in the present Catalog of Elizabeth Islands plants. The letter "N" following the name of the plant indicates it is known from Nantucket, "M" from Martha's Vineyard, and "E" from the Elizabeth Islands.

Isoetes Braunii N
Lycopodium inundatum
Schizaea pusilla
Potamogeton Oakesianus NME
Scheuchzeria palustris, var.
 americana
Triglochin maritima NME
Hierochloa odorata N
Spartina Michauxiana NME
Phalaris arundinacea
Glyceria canadensis NME
G. obtusa ME
G. grandis N
Scirpus subterminalis
S. campestris, var. *paludosus* NME

Eriophorum tenellum NME
E. gracile N
Carex lanuginosa NE
C. trichocarpa
C. exilis
C. livida
C. canescens, var. *disjuncta* NME
C. rostrata, var. *utriculata* N
C. limosa E
C. silicea NME
Eriocaulon septangulare NME
Juncus articulatus NME
J. pelocarpus NME
Sisyrinchium angustifolium NE
Populus tremuloides NM

¹ Bicknell. l. c. p. 434.

² Stone, W. l. c. p. 49.

<i>P. grandidentata</i> NM	<i>Hypericum boreale</i> NME
<i>Salix Bebbiana</i> N	<i>H. ellipticum</i>
<i>S. lucida</i>	<i>H. Ascyron</i>
<i>Suaeda maritima</i> N	<i>Myriophyllum tenellum</i> NME
<i>Chenopodium rubrum</i> N	<i>Arctostaphylos uva-ursi</i> , var.
<i>Arenaria lateriflora</i> NME	<i>coactilis</i> NM
<i>Nymphozanthus variegatus</i> NME	<i>Vaccinium pennsylvanicum</i> NM
<i>Actaea rubra</i> NM	<i>Glaux maritima</i> N
<i>Ranunculus Cymbalaria</i> NME	<i>Menyanthes trifoliata</i> , var.
<i>Polanisia graveolens</i>	<i>minor</i> NE
<i>Rosa virginiana</i> NME	<i>Limosella subulata</i> NME
<i>Dalibarda repens</i>	<i>Utricularia intermedia</i> N
<i>Geum strictum</i>	<i>Plantago oliganthos</i> NME
<i>Lathyrus maritimus</i> NME	<i>Solidago uniligulata</i> N
<i>Geranium Robertianum</i>	<i>Aster nemoralis</i>
<i>Corema Conradii</i> NM	<i>Xanthium commune</i>

As will be noted, of this list of essentially northern forms Nantucket has 41 representatives, Martha's Vineyard 27 and the Elizabeth Islands only 25.

Bicknell gives a list of northern plants which occur on Nantucket but are unknown from the coastal plain of New Jersey, only a few of them passing on to Long Island. The significant feature of this list in the present connection is that, although it contains 44 plants, not more than a half dozen of these are found on the Elizabeth Islands.

Mr. Bicknell endeavors to account for the presence of these northern forms, especially those of a maritime character, on Nantucket and elsewhere to the southwest by supposing that the same marginal land connection which allowed the plants of the southern coastal plain to reach Newfoundland would have permitted a counter extension of northern species to the southwest, perhaps at a later date. The author also points out that no farther away than Cape Cod there are established others of these northern species which have not reached Nantucket and likewise that Cape Cod possesses an extensive coastal plain flora which is not represented on this seaward island only a few miles to the southeast. These last two facts are significant because they apply, even in more marked degree, to the Elizabeth Islands. Not only, as indicated in speaking of the lists of northern species found on Nantucket, are many of these boreal forms lacking from the Elizabeths, but we also fail to find there that large element of southern coastal plain types which is conspicuous on Nantucket and almost dominant in certain regions on the Cape.

MARTHA'S VINEYARD. Unfortunately, far too little is known concerning the flora of Martha's Vineyard to permit of drawing any

conclusions as to the origin of the elements there represented. It is rather surprising that this relatively large and very attractive island should have escaped careful botanical treatment, but such is the case. This is not to say that no botanist has ever visited the Vineyard for the purpose of collecting specimens, for there have been over a score of independent collections made. A little more than a century ago, 1829, William Oakes visited the island and recorded some interesting finds. One of the most important collections made was that of Sydney Harris, who from 1891 to 1904, and again later in 1911 and 1914, collected many sheets, mostly from around Chilmark. The island was visited by C. A. Weatherby in 1900, by Professor Fernald in 1901, by A. H. Moore in 1904, by J. A. Cushman in 1906 and 1911, by E. P. Bicknell in 1909 (and again in 1912 and 1913), by F. W. Pennell in 1911, by Miss Magaret Heatley, (now Mrs. C. E. Moss), beginning in 1916; and all of these brought back material which has been distributed to one or more of the large herbaria of the eastern United States. Perhaps the largest collections made were those of Frank C. Seymour in 1916 and 1917; Seymour's specimens have been sent out by the Gray Herbarium. But, so far, no one has published any coherent account of the flora of the island, and New England botanists in general know less about its vegetation than about that of many a more isolated area.

The writer has undertaken to draw together in a single list all the records based upon specimens available from Martha's Vineyard. In the course of this task a systematic census was taken of the material in the New England Botanical Club and the Boston Society of Natural History. This resulted in the compilation of a list which includes about 700 plants. In an effort to supplement this knowledge two field trips were made to the island, one in August, 1927, and the other, in company with Professor Fernald, in August, 1928. From the information thus derived only one conclusion can be safely drawn, namely that from our present insufficient knowledge of the island, the surface only of which seems to have been touched, it is impossible to speak intelligently of the origin of its flora. One or two general statements, however, can probably be made with a fair degree of assurance.

In the first place, it seems evident that the long line of high hills which flanks the north shore from Menemsha to West Chop supports a flora of a northern or continental nature. Several plants were

found here, in the richer soils of the wooded slope, which are either absent from or far from common in southeastern Massachusetts, and it seems very likely that careful search will disclose many more things of this nature.

A second point which seems entitled to emphasis is, that, in general, the flora of Martha's Vineyard is far from being closely related to that of the southern coastal plain. Further study may serve to disprove this observation, but Professor Fernald and the writer, while exploring the region around Gay Head, were unable to escape the conviction that the flora dealt with was continental rather than coastal in character. Time and again the impression was borne home that the countless southern plants which form the primary element in the flora of the middle part of Cape Cod were conspicuously absent. An exception to this general statement may, perhaps, be constituted by the flora of the eastern part of the island, the region around Edgartown, where, apparently, there is a larger representation of austro-riparian types than may be met with elsewhere on the Vineyard. If these observations be justified, they will be found to fit in rather well with the interpretation of the effects of glacial activities upon the origin of the flora of southeastern Massachusetts.

CAPE COD. In speaking of the flora of Cape Cod it is necessary first to have very clearly in mind the fact that botanically, as well as geologically, this region is far from being a unit, but, rather, may be divided, more or less distinctly, into three separate provinces, which, for the sake of convenience, may be designated the "Upper," "Middle" and "Lower" Capes.

"*Upper*" *Cape*. This includes roughly Sandwich, Bourne, Mashpee, Falmouth and the western half of Barnstable. The line of morainal hills which traverses this province from north to south may be traced southwest from Woods Hole, as it is of this same ridge that the Elizabeth Islands are formed. On the mainland these hills are rather heavily wooded and the superficial aspect of this part of the Cape is that generally associated with an Alleghanian flora with a slight tinge of the Canadian. This impression is borne out by a study of the plants which occur here, many of which are either entirely lacking or only very locally known elsewhere on the Cape. There are well over 150 such plants, constituting a list too lengthy for inclusion here; the following few species may, however, be cited as typical:

Polypodium virginianum	B. papyrifera
Polystichum acrostichoides	Alnus noveboracensis
Thelypteris Phegopteris	Ranunculus recurvatus
Osmunda Claytoniana	Thalictrum revolutum
Botrychium virginianum	Actaea rubra
Lycopodium lucidulum	Aquilegia canadensis
L. clavatum	Chrysosplenium americanum
Potamogeton Robbinsii	Potentilla tridentata
Panicum subvillosum	Rubus allegheniensis
P. latifolium	Nemopanthus mucronata
Oryzopsis pungens	Celastrus scandens
Cinna arundinacea	Circaea latifolia
Glyceria grandis	Rhododendron canadense
G. acutiflora	Fraxinus americana
Scirpus debilis	Scrophularia lanceolata
Carex tribuloides	Pedicularis canadensis
C. scabrata	Triosteum perfoliatum
Juncus secundus	Viburnum acerifolium
Smilax herbacea	Lobelia inflata
Trillium cernuum	Solidago ulmifolia
Habenaria dilatata	Aster nemoralis
Malaxis unifolia	A. acuminatus
Betula lutea	

Few, if any, of these plants, as will be seen, may be looked upon as species characteristic of a southern coastal plain flora.

"Middle" Cape. This province embraces the eastern part of Barnstable, all of Yarmouth, Dennis, Brewster, Harwich, and, perhaps, Chatham and Orleans. A ridge of morainal hills extending east and west along the north shore from Sandwich to Dennis, forms the "backbone" of this part of the Cape and is flanked to the south by a broad outwash plain. This area is not without its trees, but in certain parts scrub oaks predominate and the appearance of the vegetation differs strikingly from that of the inner Cape. The most salient botanical feature of this province resides in the plants of the numerous ponds and pond margins, many of which are sandy or peaty and offer an ideal habitat for an extensive flora of an austro-riparian nature. Altogether there are over 200 species which are either peculiar to this part of the Cape or which here find their greatest development, being represented only casually in the other two provinces. A partial list of these plants follows:

Thelypteris simulata	S. teres
Pteridium aquilinum, var. pseudo-	Andropogon virginicus
caudatum	Paspalum psammophilum
Potamogeton pectinatus	Panicum verrucosum
Sagittaria Engelmanniana	P. Bicknellii

<i>P. microcarpon</i>	<i>Acnida cannabina</i>
<i>P. annulum</i>	<i>Spergularia canadensis</i>
<i>P. mattamuskeetense</i>	<i>Crataegus rotundifolia</i>
<i>P. mattamuskeetense</i> , var. <i>Clutei</i>	<i>Rubus tardatus</i>
<i>P. spretum</i>	<i>R. Enslenii</i>
<i>P. Wrightianum</i>	<i>R. multispinus</i>
<i>P. albemarlense</i>	<i>Lespedeza Brittonii</i>
<i>P. auburne</i>	<i>Amphicarpa Pitcheri</i>
<i>P. Commonsianum</i>	<i>Linum striatum</i>
<i>P. polyanthes</i>	<i>L. floridanum</i> , var. <i>intercursum</i>
<i>P. Ashei</i>	<i>Callitriche palustris</i>
<i>Cenchrus pauciflorus</i>	<i>Ilex laevigata</i>
<i>Spartina cynosuroides</i>	<i>Ceanothus americanus</i> , var. <i>inter-</i> <i>medius</i>
<i>Glyceria laxa</i>	<i>Parthenocissus vitacea</i>
<i>G. Fernaldii</i>	<i>Hypericum dissimulatum</i>
<i>Puccinellia fasciculata</i>	<i>Helianthemum dumosum</i>
<i>E. rostellata</i>	<i>H. Bicknellii</i>
<i>Psilocarya scirpoides</i>	<i>H. propinquum</i>
<i>Scirpus Smithii</i> , var. <i>setosus</i>	<i>Viola emarginata</i>
<i>S. campestris</i> , var. <i>novae-angliae</i>	<i>V. incognita</i> , var. <i>Forbesii</i>
<i>S. Eriophorum</i>	<i>Lythrum hyssopifolium</i>
<i>Fuirena squarrosa</i>	<i>Rhexia mariana</i>
<i>Hemicarpha micrantha</i>	<i>Epilobium molle</i>
<i>Rhynchospora Torreyana</i>	<i>Oenothera linearis</i>
<i>R. capitellata</i> , var. <i>discutiens</i>	<i>O. longipedicellata</i>
<i>Carex straminea</i>	<i>Proserpinaca intermedia</i>
<i>C. alata</i>	<i>Cicuta bulbifera</i>
<i>C. annectens</i>	<i>Lilaeopsis chinensis</i>
<i>C. laevivaginata</i>	<i>Vaccinium stamineum</i>
<i>C. Mitchelliana</i>	<i>Sabatia Kennedyana</i>
<i>Arisaema Stewardsonii</i>	<i>S. campanulata</i>
<i>Peltandra virginica</i>	<i>Apocynum medium</i>
<i>Juncus effusus</i> , var. <i>compactus</i>	<i>Cuscuta pentagona</i>
<i>J. pervetus</i>	<i>C. compacta</i>
<i>J. subcaudatus</i>	<i>Stachys hyssopifolia</i>
<i>J. aristulatus</i>	<i>Lycopus virginicus</i>
<i>Luzula campestris</i> , var. <i>echinata</i>	<i>Limosella subulata</i>
<i>Lilium superbum</i>	<i>Aureolaria pedicularia</i> , var. <i>caesariensis</i>
<i>Lachnanthes tinctoria</i>	<i>Utricularia biflora</i>
<i>Salix sericea</i>	<i>U. resupinata</i>
<i>Myrica asplenifolia</i>	<i>U. subulata</i>
<i>Fagus grandifolia</i> , var. <i>caroliniana</i>	<i>Galium tinctorium</i>
<i>Quercus stellata</i>	<i>Eupatorium hyssopifolium</i>
<i>Q. Margaretta</i>	<i>Mikania scandens</i>
<i>Q. prinoides</i> , var. <i>rufescens</i>	<i>Chrysopsis falcata</i>
<i>Comandra umbellata</i>	<i>Solidago erecta</i>
<i>Polygonum Careyi</i>	<i>S. puberula</i>
<i>P. puritanorum</i>	<i>S. Elliottii</i>
<i>P. setaceum</i>	<i>Sericocarpus linifolius</i>
<i>Chenopodium leptophyllum</i>	<i>Antennaria petaloidea</i>

A. fallax
Gnaphalium obtusifolium, var.
micradenium

Bidens coronata
Prenanthes serpentina

As will be seen at a glance, the overwhelming majority of species in this list are plants of prevailingly southern affinities. Many of them are common in the Pine Barrens of New Jersey and a considerable number were not known to occur north of there, or perhaps Long Island, when the last revision was made of Gray's Manual in 1908, but have been added to the Massachusetts flora only as the result of recent investigation. The foregoing list is not in any sense an exhaustive one, nor could it hope to be, for nearly every summer's exploration adds to the already large number of southern coastal plain species which are known to occur on the central part of Cape Cod.

"Lower" Cape. At Orleans the Cape makes a right-angle turn and continues almost due north through Eastham, Wellfleet and Truro to Provincetown, which is at the extreme tip. This "fore-arm" or outer portion of the Cape is characterized by rather high, undulating hills, the axes of which for the most part run east and west. It is thought that the troughs between these hills may have formed the delta of a glacial river which drained into Lake Agassiz, a large body of water impounded by the ice and today represented by Cape Cod Bay. From Truro northward this part of the Cape consists of a wave-built sand spit. A few of the plants peculiar to the Outer Cape, such as *Andropogon scoparius*, var. *polyclados*, *Muhlenbergia mexicana*, *Cyperus filicinus*, var. *microdontus*, *Orontium aquaticum*, *Opuntia vulgaris*, *Aureolaria pedicularia* and *Baccharis halimifolia*, are far-ranging southern species, but the significant feature of the flora of this province is that most of its specialties are forms which display a northern or at least a continental affinity. The following are a few of the plants belonging to this category:

Potamogeton natans
Elymus arenarius, var. *villosus*
Scirpus atrocinctus
Eriophorum spissum
Carex Muhlenbergii, var. *enervis*
C. limosa
C. oligosperma
C. lasiocarpa
C. Pseudo-Cyperus
C. bullata
Juncus effusus, var. *Pylaei*
J. articulatus, var. *obtusatus*

Allium canadense
Liparis Loeselii
Salix lucida
Ranunculus sceleratus
Cardamine parviflora, var.
arenicola
Pyrus melanocarpa
Potentilla tridentata
Rubus idaeus, var. *strigosus*
R. orarius
R. amnicola
R. recurvicaulis

<i>R. arcuans</i>	<i>Arctostaphylos Uva-ursi</i> , var.
<i>Prunus virginiana</i>	<i>coactilis</i>
<i>P. pennsylvanica</i>	<i>Vaccinium pennsylvanicum</i> , var.
<i>Corema Conradii</i>	<i>myrtilloides</i>
<i>Ilex verticillata</i> , var. <i>fastigiata</i>	<i>V. Oxycoccus</i>
<i>Hudsonia tomentosa</i> , var. <i>inter-</i>	<i>Galium trifidum</i> , var. <i>halophilum</i>
<i>media</i>	<i>Linnaea borealis</i> , var. <i>americana</i>
<i>Circaea alpina</i>	<i>Bidens cernua</i>
<i>Cornus canadensis</i>	<i>Lactuca Morssii</i>
	<i>Hieracium marianum</i>

Most of the species listed above are of a prevaillingly northern distribution; their affinities are with the widely dispersed Canadian flora to the west and northwest. A few of them are here at, or near, the southern limit of their ranges.

Thus, it will be seen, each of the three natural divisions of Cape Cod possesses a rather distinctive flora: that of the Inner Cape is essentially of a continental Alleghanian-Canadian character; that of the Middle Cape is colored by the presence of a considerable number of Carolinian or even Louisianian types; while that of the Outer Cape is rendered striking by the occurrence of so many species of Canadian, or in some cases even Hudsonian, affinities. An attempt to explain the underlying reasons which account for this differentiation will be made in summing up the evidence for the origin of the flora of the Elizabeth Islands themselves.

ELIZABETH ISLANDS. Turning now to the region under immediate consideration, we find that the total number of species, varieties and forms of vascular plants known to occur upon the Elizabeth Islands is 686. Of these, 128 ($18\frac{1}{2}\%$) are introduced, while 558 ($81\frac{1}{2}\%$) may safely be classed as indigenous.

Introductions. The subject of those species of plants introduced on the Elizabeth Islands was dealt with at such length in the section on Changes in the Flora that it seems scarcely necessary to develop it further here. It need merely be pointed out that by far the larger part of these introductions is comprised of those ubiquitous European and Asiatic adventives which everywhere throughout eastern North America have taken possession of recently cleared ground or disturbed sandy areas, often completely dominating our native flora. The rest of the exotics are either garden escapes, as exemplified in the discussion of the foreign elements in the flora of Penikese, or species, such as the *Cytisus* or the various Spruces, which have been deliberately planted by man for a special purpose. A few plants

native to North America are certainly not of indigenous occurrence on the islands, but have been introduced either accidentally or intentionally. As examples of such may be mentioned *Glaucium flavum* and *Solanum triflorum*, which grow on the beach near Tarpaulin Cove, Naushon, and *Juniperus communis*, var. *depressa*, which appears to have been planted along the north shore at the west end of the same island.

(To be continued)

WHAT IS SCIRPUS CAPITATUS LINN?

OLIVER ATKINS FARWELL

IN RHODORA for February, 1918, pages 23 and 24, Mr. S. F. Blake attempts to show that the Linnean name should apply to what has generally been known as *Eleocharis tenuis* (Willd.) Schultes and also that *E. capitatus* (L.) R. Br. must be considered as a synonym of it.

Blake says: "The name *Eleocharis capitata* (L.) R. Br., Prod. Fl. Nov. Holl. i. 225 (1810), has a somewhat peculiar status. It was based on 'Scirpus capitatus, Linn., sp. pl. ed. Willd. 1. p. 294,' but was expressly distinguished from the Gronovian plant, which of course Brown had examined, type of *S. capitatus* L. Since however Willdenow's *S. capitatus* is based directly on Linnaeus's, the application of Brown's name must be determined by the Clayton plant on which rests the name-bringing synonym of Linnaeus. The name *ELEOCHARIS CAPITATA* (L.) R. Br. must therefore now be restricted to the plant which has long been called *Eleocharis tenuis* (Willd.) Schultes."

There are several errors in the above:

- (1.) The Clayton plant is not the type of the species.
- (2.) "(L.)" should not be placed before "R. Br.", since Brown expressly said that the Gronovian plant was not his species, but that he based his name on *S. capitatus* Willd., which are not synonymous names, Blake to the contrary, notwithstanding.
- (3.) "Linn" is not the author of *Scirpus capitatus* Sp. Pl. IV. 1. p. 294, but Willdenow is.
- (4.) The making of Brown's name a synonym of Schultes's name in face of Brown's express statement that they were not the same. I cannot follow the twistings and windings of a brain that will de-

liberately place a name where the original author expressly says it doesn't belong.

Blake says that the Linnean *S. capitatus* Linn is based "almost entirely on the Gronovian reference, which in turn is based on Clayton 380," Not so!!! Linn had his own description, similar it is true, but quite distinct, and it was based, in my estimation, not on the Gronovian reference and the Clayton plant but on the only plant at that time in his herbarium, which he himself named *S. capitatus*; Blake says this plant is what is now known as *Eleocharis obtusa* (Willd.) Schultes. It fits the Linnean description quite well enough to be its type, and should be so construed. *E. obtusa* (Willd.) Schultes then becomes a synonym of *E. capitatus* (L.) n. comb. *Scirpus capitatus* Linn; also of Willd. p. p. *E. capitatus* (Willd.) R. Br. is a synonym of *E. caribaea* (Rottb.) Blake.

While it is true that Linn listed the description of Clayton's plant by Gronovius as a synonym, yet Linn's own description, though very similar, and his herbarium specimen from which that description was drawn should take precedence over any synonym quoted.

Willdenow's *S. capitatus*, as indicated above, not only included the Linnean species of the same name but also a West Indian species, and it was to this West Indian species that R. Br. restricted the name when he transferred it to *Eleocharis*. As pointed out by Blake, it has an older name; it occurs also in the southeastern United States.

Like Dr. Britton, I think it incredible that any author should call such a spike as is found on *E. tenuis* "subglobose," and in consequence assign it the name of *capitatus*. It seems more reasonable to believe that the original Clayton plant on which the Gronovian description was based was a plant with a subglobose spike (*E. obtusa* or even *E. capitata* as applied in our local manuals) and that the original specimen was exchanged or lost and later replaced with the plant at present in the Clayton collection. Too much reliance should not be placed upon specimens in old herbaria. It is a well known fact that such changes in the older herbaria were frequent, if not more frequent than otherwise, and if such a change occurred in the present instance, all confusion over the terms "subglobose" and "capitatus" would immediately disappear and vanish into thin air.

DEPARTMENT OF BOTANY,
PARKE, DAVIS & Co.,
Detroit, Michigan.

THE TYPIFICATION OF *SCIRPUS CAPITATUS* L.

S. F. BLAKE

MR. Oliver A. Farwell, in the preceding paper, has sought to show that I erred in transferring¹ the name *Eleocharis capitata* (L.) R. Br. to the species generally known as *Eleocharis tenuis* (Willd.) Schultes. Mr. Farwell, while admitting that the species long known as *E. capitata* must now be called *E. caribaea* (Rottb.) Blake, would typify the Linnaean name *Scirpus capitatus* by a specimen of *Eleocharis obtusa* (Willd.) Schultes collected by Kalm, which he assumes to have been the basis of the Linnaean description, and he makes what he calls the "n. comb." *E. capitatus* (L.) Farwell for the latter plant. His chief reason for so doing seems to be contained in his statement that "Linn had his own description, similar it is true [to that of Gronovius], but quite distinct, and it was based, in my estimation, not on the Gronovian reference and the Clayton plant but on the only plant at that time in his herbarium, which he himself named *S. capitatus*."

Linnaeus' treatment of *Scirpus capitatus* (Sp. Pl. 1: 48. 1753) is so brief that it may be reproduced once again:

5. *Scirpus culmo tereti nudo setiformi, spica subglobosa.*

Scirpus culmo setaceo nudo, spica subglobosa. Gron. virg. 12. Habitat in Virginia.

Two features in Linnaeus' diagnosis which have made several authors² doubt that it could have referred to *Eleocharis tenuis*, with its 4-angled culms and slender spikelets, are the description of the culm as terete and the spikelet as subglobose. I believe that too much has been made of these supposed discrepancies. Linnaeus' diagnoses were very brief, and general terms were often used for the sake of brevity. As regards the spikelets, there is no difficulty. Examination of the material of *Eleocharis tenuis* in any large herbarium will disclose plenty of specimens, particularly those with young spikelets, in which these are broad enough to be described as subglobose. Moreover, my photograph of Clayton 380 in the British Museum (type specimen of *Scirpus capitatus*) shows that its spikelets are rather strongly flattened out and might easily have been so described. As regards the "terete" culms, it is easy to show that

¹ RHODORA 20: 23-24. 1918.

² Britton, Torrey 19: 246 1919; Chase in Hitchcock and Standley, Contr. U. S. Nat. Herb. 21: 95. 1919; and now Mr. Farwell

this term was loosely used by Linnaeus. Most of his species of *Scirpus* described as possessing terete culms really have them so; but he applied the same adjective "tereti" to the culms of *Scirpus acicularis* (*Eleocharis acicularis*), which are "usually angular and sulcate,"¹ of *S. fluitans*, which are "etwas zusammengedrückt,"² of *S. capillaris* (*Stenophyllus capillaris*), which are strongly striate-angled, of *Schoenus mariscus* (*Mariscus serratus*), which are 3-angled above, of *Schoenus mucronatus*, which are "stumpf 3kantig,"³ of *Eriophorum vaginatum*, which are "oben 3kantig,"⁴ and of *Eriophorum virginicum*, which are trigonous above.

It is possible that Linnaeus' own diagnosis, which differs in no essential from that of Gronovius except by the introduction of the word "tereti," was based on specimens of *Eleocharis obtusa* collected by Kalm. There is, however, nothing to prove that this was the case. Mr. Farwell, apparently relying on my statement that there is a sheet of this species in the Linnaean Herbarium "collected by Kalm and known to Linnaeus before 1753," takes it as the type and interprets the name *Eleocharis capitata* accordingly. My statement that Linnaeus had seen Kalm's plant before 1753 is presumably correct, since Kalm is known to have brought his American plants to Linnaeus in 1751; but this sheet, according to the evidence available, was not in the Linnaean Herbarium in 1753! The late Dr. B. Daydon Jackson's "Index to the Linnean Herbarium" (p. 132. 1912) shows that the specimens representing *Scirpus capitatus* in the Linnaean Herbarium were not recorded in the enumeration of its contents in 1753; and Robert Brown's own note (*Prodr. Fl. Nov. Holl.* 1: 225. 1810), when making the name *Eleocharis capitata*, confirms this and upsets Mr. Farwell's whole case:

Scirpus capitatus. *Linn. sp. pl. ed. Willd.* 1. p. 294. (secundum synonyma Brownii et Sloanii, sed a plantâ virginianâ in Herb. Gron. diversus, haec autem, quoniam Linnaeus nullum exemplar habebat in herbario suo cum primûm Sp. pl. edidit hujus speciei unica auctoritas est).

It will be difficult to controvert Brown's statement that the Clayton plant is the sole authority for Linnaeus' *Scirpus capitatus*. Whether Linnaeus' "tereti" was based on supposition only (all the other species in that group of his genus *Scirpus* having terete culms) or

¹ Svenson, *RHODORA* 31: 184. 1929.

² Hallier & Brand in Koch, *Syn. Deutsch. & Schw. Fl.* ed. 3. 3: 2539. 1907.

³ Hallier & Brand, l. c. 2558.

⁴ Hallier & Brand, l. c. 2526.

whether it was based on some specimen, now lost or impracticable to trace, of *Eleocharis obtusa*, *E. caribaea*, or some other species, seems now impossible to establish.¹ The only plant definitely associable with his 1753 description is the specimen of Clayton 380 in the British Museum, and that plant is *Eleocharis tenuis* of authors.

Scirpus capitatus of Linnaeus in 1753 is, then, certainly the *Eleocharis tenuis* of modern authors, and the name *Eleocharis capitata* cannot be applied to *E. obtusa*. Is it possible to exclude the original *Scirpus capitatus* from consideration and preserve the name *Eleocharis capitata* (Willd.) R. Br. or *E. capitata* R. Br. for the plant (*E. caribaea* (Rottb.) Blake) which has passed so long under that name? Not according to modern nomenclatorial practice. If Brown had given a new specific name to the plant he described, it would have held; but as he continued the name already used by Linnaeus and Willdenow, the application of his name must be determined by the name-bringing synonym, which must be taken from one of those authors. Willdenow's description and synonymy included also the plant which has generally been known as *Eleocharis capitata* (*E. caribaea*), but his name, his first reference, and his first locality are taken from Linnaeus, so that for purposes of typification his use of the name is the same as that of Linnaeus. It may be remarked in passing that Mr. Farwell's proposal of a third usage of the name *E. capitata* as a new combination is not in accord with either of the codes of nomenclature in current use.

In conclusion, it may be pointed out that my interpretation of *Eleocharis capitata* (L.) R. Br. in the sense of *E. tenuis* (Willd.) Schultes has been followed by Fernald,² Merrill,³ and Svenson;⁴ and that Britton⁵ and Britton and Wilson,⁶ although not dealing with *E.*

¹ When Linnaeus' diagnostic phrase ("nomen specificum") differs from any synonym given, it is evidently based, in practically all cases, either on the synonyms cited or on material examined in the garden or in some herbarium. It is probable, then, that he had seen other specimens which he considered identical with Clayton's plant, which he had presumably examined when assisting Gronovius with the preparation of the "Flora Virginica." In view of Brown's very definite statement and of the record in Jackson's Index, it is obviously impossible to prove that these supposititious specimens were those from Kalm now in the Linnaean Herbarium. In 1918, with all the facts before me, I selected Clayton's plant as the type of the Linnaean name. This designation will hold unless overthrown by real evidence to the contrary, which Mr. Farwell has not produced.

² RHODORA 23: 106, footnote. 1921.

³ Enum. Phil. Flow. Pl. 1: 119. 1923.

⁴ RHODORA 31: 128. 1929.

⁵ In Abrams, Ill. Fl. Pacific States 1: 262. 1923.

⁶ Scient. Surv. Porto Rico & Virg. Isl. 5 (Bot. Porto Rico & Virg. Isl.): 91. 1923.

tenuis, have adopted the name *E. caribaea* for the plant generally known as *E. capitata*.

BUREAU OF PLANT INDUSTRY,
Washington, D. C.

TRIPSACUM DACTYLOIDES IN MASSACHUSETTS.—Subsequent to the publication of the 7th edition of Gray's Manual, which cites Connecticut as the northeastern limit of range for *Tripsacum dactyloides* L., at least two Rhode Island stations have been discovered, one of which is in Bristol County, on the east side of Narragansett Bay. Thus it is not surprising that an extension of the range of this species into Massachusetts has been made by Mr. G. L. Stebbins at Westport Point while collecting for the New England Botanical Club during its annual field trip last September. He discovered a small colony of this curious grass in marshy ground at the top of a shingle beach within a rod or two of salt water. A specimen has been placed in the Club Herbarium.—R. J. EATON, Cambridge, Mass.

NOTE ON ASTER AMETHYSTINUS.—The article in RHODORA for January, 1930, discussing *Aster amethystinus* as an obvious hybrid, recalled my own experiences with this rare and fascinating plant. I first noted it in the northern part of Williamstown, Massachusetts, September 23, 1924. I was driving along the road parallel to the Boston & Maine railway track. A large clump in full bloom attracted me by its peculiar amethystine color, and I stopped to investigate and collect. Both *Aster novae-angliae* and *A. multiflorus*, the putative parents, were abundant close by.

Some time after I noticed in the Vermont Flora that the only authentic station for *Aster amethystinus* in that state was at South Pownal, where the plant was collected by W. W. Eggleston before 1900. I reasoned that this must be in the same general region. Accordingly, October 5, 1926, I stopped at the Williamstown station again, climbed the fence to the railway track, and followed it several rods across the state line into Vermont, till I discovered what may well have been Eggleston's original stand of the hybrid. The two parent species were scattered about in considerable profusion.

It would be a very interesting project for some botanical garden or experiment station to breed this interesting hybrid artificially for

comparison with the wild plants.—CLARENCE HINCKLEY KNOWLTON,
Hingham, Massachusetts.

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